

present were expected to speak upon them. The production of gold was £6,500,000. Of this the larger portion was from quartz-mining, the placer production having very much fallen off owing to the unfavourable legislation in California. The speaker referred to the tellurides as true ores of gold, and predicted that while at present they were found in large quantities only in Colorado, they would be found in much greater quantities north and south. The production both of gold and silver would undoubtedly be increased as transportation facilities were increased in localities now nearly inaccessible. The placer mines of North Carolina and Georgia had, he believed, a great future before them. A successful process was required for working the enormous dry deposits of Arizona and New Mexico without water. The silver production is over £10,000,000 sterling. The rich deposits of Leadville (Colorado), the Comstock mines in Nevada, the Silver King and other localities in Arizona, Silver City and Lake Valley (New Mexico), were referred to. At the latter a chamber was found not much larger than a common room from which £100,000 worth of ore was taken. It was chloride, so rich that it would fall in drops of nearly pure silver with the heat of a lighted match.

The American copper mines are the richest in the world; the production being over £4,000,000 sterling, of which the "Calumet and Hecla" claims one-fifth. They have over seventeen years' supply in sight, and practically the supply is inexhaustible. The "Anaconda" of Montana, and neighbouring mines, also produce about one-fifth. These localities are so rich, so easily worked, and above all so accessible, that the extraordinarily rich mines of Arizona, where transportation is much more costly, have suffered severely by the competition. The mines near Clifton (Arizona) produce a charming combination of malachite and azurite, which is one of the most beautiful ornamental stones ever seen. At the Copper Queen mine malachites fully equal to those of Russia, and azurites as finely crystallized as those of Chessy, France, are found.

The lead production is of the value of £2,100,000 sterling, most of which is a by-product of the Rocky Mountain silver mines. This production is so great that it has rendered mining for lead alone unprofitable at the wonderfully rich South-West Missouri region. A very interesting fact is that the vanadates and molybdates of lead replace the phosphates in all the western region. As vanadium salts are rapidly increasing in importance in the manufacture of the aniline dyes, this will be a future source of wealth, for there are mines here that can produce more vanadium than all the rest known in the world. The molybdates from Arizona and New Mexico are the finest ever seen.

The production of zinc was £1,000,000 sterling, three-quarters of which is found in South-West Missouri and Kansas. Four railroads have been constructed within a few years to carry away the rapidly-increasing production. The zinc mines of Franklin, New Jersey, have been known for over a hundred years and are remarkable not only for their richness but for the extraordinary number of rare and beautiful species that are found there and nowhere else in the world. The localities of mercury, nickel, manganese, tin, chromium, platinum, and other metals were also spoken of.

Among non-metallic minerals the phosphates of South Carolina were the principal, over £750,000 sterling being produced annually for fertilizers. Vast deposits of gypsum or plaster-stone are found in Michigan, Ohio, New York, and other localities. Mica is principally mined in New Hampshire and North Carolina. This is the mineral popularly but erroneously known in England as talc. Talc is a very different material, also found in North Carolina, but used for the tips of gas-burners and as a lubricator. The principal use of mica is for the windows of coal-stoves. Many very interesting minerals occur in connexion with the mica, such as beryls of enormous size, emeralds of great value, garnets, and so forth.

The time was so fully taken up with the ores and economic minerals that the gems and ornamental stones were treated of in a lecture delivered on October 22.

THE EXPLORATION OF NEW GUINEA.

ON August 11 (p. 351) we reprinted from the *Sydney Morning Herald* an account of an exploring expedition in New Guinea, conducted by Mr. Theodore Bevan in the steamer *Victory*. Another Australian paper, the *Daily Telegraph* of July 9, gives, with the map which we reproduce, a more

detailed narrative, compiled from Mr. Bevan's notes. From this narrative we take the following passages:—

The *Victory* left Thursday Island at 5.30 a.m. of Thursday, March 17, and was headed for Cape Blackwood at the mouth of the Aird River, New Guinea, and distant 220 miles. On the following Saturday, early in the morning, the distant mountains of Papua were sighted, and at 6 o'clock Cape Blackwood was seen. Shaping a course after passing inside the cape to the north of Entrance Island and steering past it, the party found that the River Aird narrowed to about 200 yards, and after steaming from Entrance Island a distance of 5 miles, about 4 p.m. they came to a broad but seemingly shallow stream running into Deception Bay. (Deception Bay is the open space shown on the map between Cape Blackwood and Bald Head.) . . . It was found that the country between Deception Bay and the Aird River was made up of islands instead of being mainland as charted by Blackwood. Further, from a great number of water-ways and river openings on every side, it became evident that this was nothing less than the delta of a large fresh-water river, whose source was in the mountains seen from the coast. Steaming up this river, leaving alluvial scrub-covered islands to the left, and passing broad streams each over half a mile wide on the right, the party found that deep water was carried to an important junction (named after Mr. John Brazier, of the Australian Museum) right under and to the south-east of Aird Hills. Here the river threw off two branches, one skirting the hills to the south and the other bearing north by east. Brazier Junction was found to be distant, as the crow flies, 30 miles from Cape Blackwood. . . . A portion of the party proceeded in the whale-boat for a distance in a north-westerly direction of about 6 miles, when to their surprise a wide branch of the river was opened up north by west, two important openings towards the south-west being also seen and named after Mr. Cuthbertson and Mr. Cosmo Newbery. It was becoming more and more evident that the main stream of a delta in a large fresh-water river had been reached, the southerly-running channels being divisions, and the Cuthbertson and Newbery Rivers probably discharging their vast volumes of water into Prince George's Inlet several miles westward of Cape Blackwood. This main stream was explored for some 5 miles, the depth being from 2 to 7 fathoms. The country around was of alluvial formation, and scarcely above the level of the river, but thickly covered with virgin forest, the trees reaching a height of 150 feet, and crusted with mosses, fungi, creepers, and orchids in tropical luxuriance. A magnificent view was obtained at one part of tier upon tier of ranges of hills to the northward, and behind these blue mountain peaks of from 7000 to 8000 feet in altitude, and from 40 to 50 miles distant. The river itself in the various branches looked like an immense lake studded with islands. This main channel the steamer proceeded up on the day following, and a second range of low palm-clad hills observed in front on the previous day proved to be the head of the delta. This was named after Mr. J. V. S. Barnett, of Cooktown, Queensland. This spot, as the crow flies, was 45 miles from Cape Blackwood, and only now could it be properly stated that *terra firma* had been reached, for south of them the soil was alluvial, being brought down from the mountains by this great stream, the volcanic cones of Aird Hills, rising to a height of 1620 feet to the south-east, being the solitary exception in these miles of dead-level, scrub-covered, deltaic alluvial flats. North of Barnett's Junction the river flowed between compact banks, through gradually rising country, and with an exclusive fresh-water current.

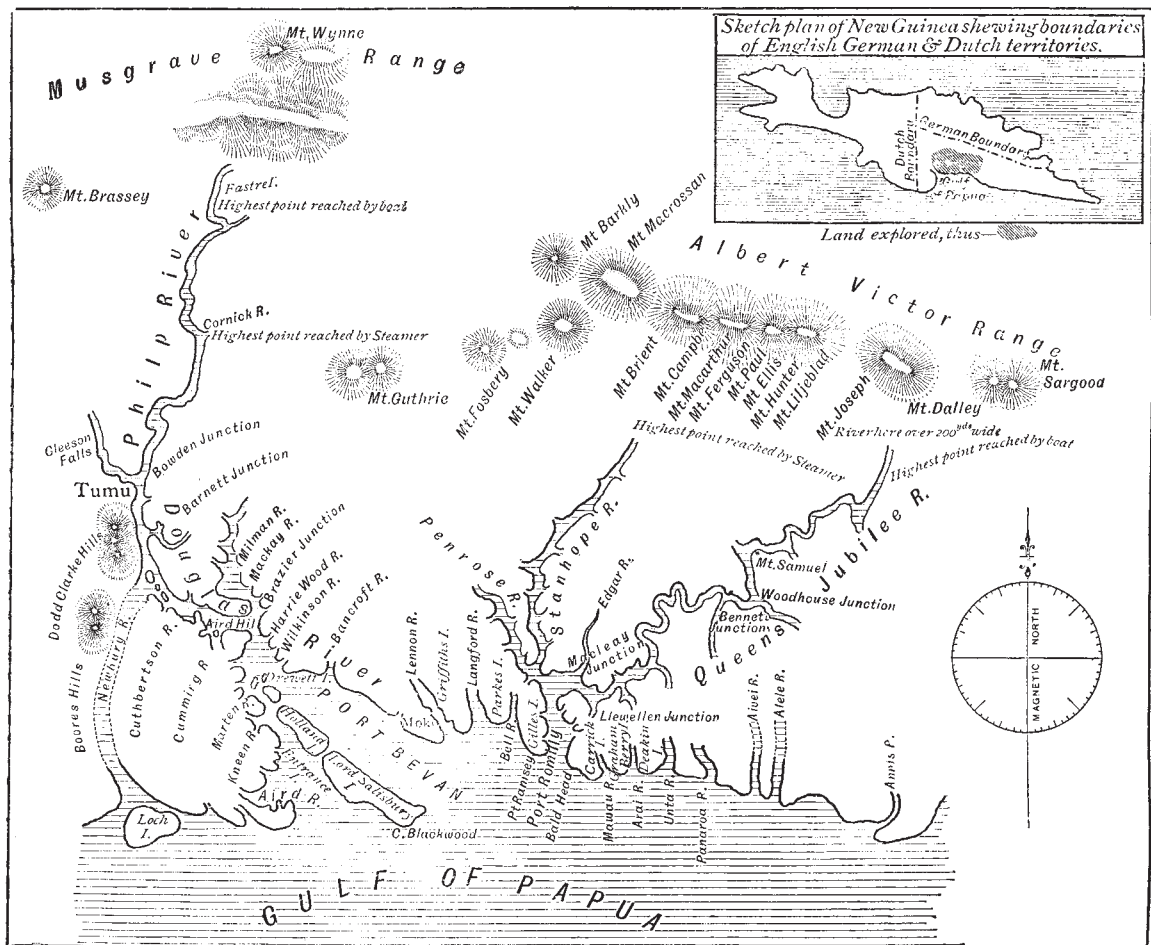
On March 25, after proceeding up the river a few miles, a third series of palm-topped conical hills were seen, and on the summit were two of their native houses, being about 200 feet in length. It was soon evident that the strange apparition of the steamer gliding into these fastnesses was visible from the shore, as the mellow sound of the conch shell was heard, warning the inhabitants of the scattered village of danger. Slowly the steamer approached, and when abreast of the village and opposite a creek some canoes full of savages were seen scuttling up the place in abject terror. The river now gradually widened out, and two large tributaries, running one from the north-west and the other from the north-east, were seen. This junction was observed to be in latitude $7^{\circ} 11'$, and 144° east longitude. . . . The junction of these rivers was named after Mr. V. R. Bowden, of Thursday Island, the north-west and north-east branches being named after Messrs. Burns and Robert Philp, while the great river running from Bowden Junction into Deception Bay, a distance of over 60 miles, was called after the Hon. John Douglas.

The steamer was taken cautiously up Burns River, the north-west branch, and a splendid view of near mountain ranges was obtained, and apparently a splendid spot to explore. . . . Seven miles up the river an anchorage was come to, the river being over 300 yards wide, and the soundings being from 2 to 6 fathoms. The scenery was picturesque in the extreme. Hills of from 600 to 1000 feet, clothed with verdure, came down to the water's edge. There were cedars, oaks, eucalypti, fig-trees, acacias, pines, palms, and tree-ferns. Feathery bamboos, ferns and varied flora adorned the river banks. Butterflies of gaudy hue, and birds of the brightest plumage, flutter in and out amongst the trees and shrubs. The water was placid and in the deepest recesses of the gorge-like ranges was sombre and cold. . . .

A few miles further up the river a small rapid was passed, and it was then found that there was a break, one arm apparently

running in a northerly direction towards ranges about 4 miles distant, and from 2000 to 3000 feet high, and the other arm stretching easterly towards high distant ranges, which closed in the horizon in that direction also, but they appeared to be about 25 miles off. This junction was named after the *Victory*, but the steamer could not pass it to any distance. The highest point reached by the steamer was ascertained to be in south latitude $6^{\circ} 51'$, and east longitude $144^{\circ} 8'$, that is to say 65 miles in a straight course from Cape Blackwood, or nearly 90 miles by river courses. This was on March 31.

A boat party was formed of eleven, and a week's provisions put in, but progress was slow, owing to the strong currents, the rapids, and the heavy rain that now came on in the evening. . . . The highest position inland reached by the whale-boat was within 25 miles of the German boundary, or 80 miles as the crow flies south-by-west of Cape Blackwood, and over 100



miles by river courses. This was in south latitude $6^{\circ} 39'$, and east longitude $144^{\circ} 11'$. It appeared to Mr. Bevan that the natural boundary or water-parting between the river systems of the two territories might be found to exist a few miles to the north of the present German boundary. . . . The nature of the coast for several miles to the westward was now known, and it remained [after return to Deception Bay] to continue explorations to the eastward, and also to settle the point as to whether from so far in the heart of Deception Bay there existed a deep water channel leading out into the Gulf of Papua. Mr. Bevan decided to test this question. Although there were the river openings between them and Bald Head, it was unlikely that there would be room for any considerable river between the newly-discovered Douglas River and the large river of which it had been for years reported that the five openings east of Bald Head were separate mouths. Mr. Bevan first proceeded to Motu

Motu, situated at the mouth of the Williams River on the easternmost boundary of the gulf, and 100 miles distant, in order to send off despatches. A start was made from Motu on Monday, April 11, and after calling at Karama, Silo, Namai, and Vailalla, they anchored off Oroko, in rather dirty weather. On April 14 the steamer was within a few miles of the Alele River, or first of the five openings east of Bald Head, reported by the natives as leading into one large river. Upon superficially examining the entrances to these five rivers, namely, Alele, Aivei, Panaroa, Unta, and Arai, no safe channel for the steamer could be found, owing to the heavy break on each bar. Off the next opening, or Marwau River, the same conditions were experienced, and there now remained but the wide entrance marked on the Admiralty chart. Towards this opening the steamer was steered, and carefully proceeded in with a 2½ fathoms channel at low water, leading half a mile to the west of Bald

Head, an anchorage being found 2 miles within in 15 feet of sheltered water. Point Ramsay (named by Mr. Bevan) was 3 miles to westward, over an unbroken stretch of water, which also ran far inland to the north. This was an important discovery, as no ship had before been within this opening, and the *Victory* had again passed the confines of the known. In a little bight under Bald Head a village was discovered partly hidden and sheltered by a grove of cocoa-nut trees. Canoes with natives came off, and though shy at first, they afterwards came near. . . . The anchorage was left at 7.45 a.m., and $2\frac{1}{2}$ fathoms deep was taken into a channel 5 fathoms in depth midway between Bald Head and Point Ramsay. For over 8 miles, with a depth of from 5 to 9 fathoms, the vessel proceeded until an important junction was reached. Here land traversed the horizon, and broad arms coming in from north-west to north-east joined the river. This junction was named after the Hon. W. Macleay, of Sydney, and the sheet of water so far traversed from Bald Head was named Port Romilly.

Round the point, and at a distance of 4 miles, a second junction was met with, and named after J. Beveridge, one of the party. At this point the river was nearly half a mile wide, and an extensive mud-flat was met with. Some very fair agricultural land was now passed through, with light chocolate soil, and covered with scrub that could be cleared with ease. Freshwater springs were noticed flowing over the banks. Numerous small deserted huts were passed, and a number of alligators and flying foxes. The rule seemed to apply in these deltaic rivers that the land was making on the convex side, while the deepest channel and strongest current were found close to the concave bank. The country now passed through alluvial swampy land, in which nipa and sago palms flourished amidst a thick scrub. The river narrowed to 60 yards, and at low tide the water was quite fresh. It was found necessary to anchor here, and some of the party, getting into the whale-boat, rowed up the river, which continued to get narrow, until it broke up into several deep but very narrow creeks, and further navigation was closed. The highest point reached up this river, which was named after the Hon. Edward Stanhope, was $7^{\circ} 14'$ south latitude, and $144^{\circ} 28'$ east longitude, being 34 miles due north from Arai River on the coast, or 40 miles by river courses to Bald Head. Returning to Beveridge Junction, the *Victory* was taken up an arm coming in here from the west. Several openings into the arm were passed, but after proceeding 7 miles up it shallowed to 11 feet. The river was named the Penrose, after a gentleman of that name of Yulgilbar, in this colony. On this river a native plantation and some natives were seen. The steamer was taken to an anchorage at Macleay Junction. After exploring with boats the eastern channels of this junction, and meeting with natives who were of an extremely friendly disposition, the *Victory* was taken up the channel. The houses of the natives were raised on piles of the hog-backed shape, open in front and with protruding peaks. The village was called Piri Evorra. Continuing on its way, about midday the steamer, to the great satisfaction of all, ran at right angles into a fine new river running north, north-east, and south. This seemed to form certain proof that they were now in the one large river reported by the coast natives. This junction, which was 11 miles west by north of Macleay Junction, was named after Dr. Llewellyn Bevan, of Melbourne, a family connexion of the leader. Taking the north-east branch of the river, which is 300 yards wide, some fine-looking, well-timbered country was passed through. Several deserted dwellings were noticed. After passing several miles up this splendid river another junction was met with, where a broad stream over half a mile in length came in from the easterly direction, and bifurcated into the channel, and a wide stream flowing south-south-westerly, with a steady fresh-water current flowing seaward. This junction was named the Bennett Junction after a friend. Three miles further up, and still another junction was met with, named after Mr. William Woodhouse, of Sydney. This proved to be the head of the delta of the great fresh-water river up which they had come, and which was named the Queen's Jubilee River. At this point the river again bifurcated, throwing off one main branch half a mile wide running down to Bennett Junction, and the other flowing easterly and southerly. Past Woodhouse Junction the river maintained its width of fully half a mile, and a range of hills 2000 feet high, a few miles distant, was named after Sir Saul Samuel. Mountain peaks of great altitude were visible some 40 miles to the north. Still proceeding up the river, a rapid some miles further on

was passed, and soon afterwards it was found necessary to stop, but for one day over 30 miles had been travelled. The highest position reached was south latitude $7^{\circ} 18'$, and east longitude $144^{\circ} 59\frac{1}{2}'$, and distant 45 miles from Bald Head, and over 100 miles by the remarkably tortuous courses. As the river had now become unsafe, and only two days' coal were left for river work, it was found necessary to return to Bennett's Junction, from which it was hoped that the broad channel leading to the sea would be taken; but the master of the *Victory* demurred to this step, owing to the strong current running. The same objection had to be taken to the opposite, the southerly stream, at Llewellyn's Junction. The course was therefore taken by the one whereby the *Victory* had been brought in, and on Thursday, April 28, Bald Head was passed through again, and after putting in at Orokololo, a course was steered for Motu, which was reached shortly before noon on the following day. York Island was reached on May 1, and Thursday Island on the following day, and on May 3 the *Victory* once more steamed to an anchorage at Thursday Island after an eventful and most successful journey into the interior of New Guinea.

THE WHEAT CROP OF 1887.

SIR J. B. LAWES forwards to us the following information:—
“The very low prices during the last few years have, it is supposed, induced farmers to use a not inconsiderable quantity of their wheat as food for stock. The amount so withdrawn from human consumption is quite unknown. It has been estimated by some to be considerably less than one million, and by others to be even as much as two million quarters within the harvest year. Whatever the amount may be, it is evident that a new element of uncertainty is thus introduced into our estimates of the quantity of imported wheat required to supply the deficiency of the home-grown crop.

“The ‘Agricultural Produce Statistics’ published at the beginning of the year give, as the result of inquiries in fourteen thousand parishes in Great Britain, and many in Ireland, an average yield of 26.89 bushels per acre for the wheat crop of the United Kingdom in 1886. If we deduct from this amount $2\frac{1}{2}$ bushels per acre for seed, as we did in the case of our own estimate, it leaves only $7\frac{1}{4}$ million quarters available for consumption by the population and for stock feeding. The imports less exports for the harvest year ending August 31, 1887, amounted to $17\frac{1}{4}$ million quarters, making altogether a total of little over $24\frac{1}{2}$ million quarters. But assuming the consumption per head of the population to be 5.65 bushels, which is the figure we have adopted for the last ten years, the amount so required would, independently of the quantity consumed by stock, be $26\frac{1}{2}$ million quarters, or two million quarters more than the estimated available home produce and imports taken together. By the kindness of Messrs. Beerbohm I have been furnished with a statement of the amount of wheat, and of flour reckoned as wheat, in warehouse on July 1, 1886, and July 1, 1887, from which it appears that the stocks were slightly the higher in 1887, whilst it is estimated that subsequently to that date they somewhat increased.

“Our own estimate of the yield of the wheat crop of 1886 was $29\frac{1}{4}$ bushels. This is considerably higher than that of the Government above quoted; and it is also higher than the estimates of others. According to our figure, the available supply of home produce was nearly 8 million quarters. Even with our higher estimate of the home crop, there is still a deficiency in the imports for the estimated requirements for human consumption, to say nothing of the amount consumed by stock. The evidence so far would thus seem to suggest the question whether there has not been some decline in the consumption per head of the population. At the same time it should be stated that if we take our own estimates of the available home produce and the recorded imports for the whole period of the eleven harvest years 1876–77 to 1886–87 inclusive, for which we have adopted a consumption of 5.65 bushels per head, the result shows precisely that amount available, if no allowance be made for consumption by stock. It is obviously desirable, however, that those who are engaged in forming the estimates of the yield of the wheat crop should also endeavour to ascertain the facts as to the quantity of wheat consumed by stock.”

Sir John Lawes next exhibits tables proving his estimate as to the average yield of wheat at Rothamsted, and explains the peculiarities of the late season with regard to the growth of wheat.